Flying into Restoration: A Native Songbird Habitat Restoration for Grassy Creek Regional Park in Indianapolis, Indiana

An Honors Thesis (LA 404)

by

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ABSTRACT

This project focuses on Indianapolis's ecological health with respect to native songbird habitats. Songbird populations in the eastern United States have been declining since World War II, and strong populations and rich biodiversity of songbirds typically mean a healthy ecosystem. This project explores how that health can be improved by implementing a native songbird habitat restoration at Grassy Creek Regional Park in Indianapolis.

Many factors influencing songbird habitat suitability have been researched, including critical plant species, ideal mating and nesting conditions, interior-to-edge ratios, and others. Several interviews have been conducted not only with experts on the topic, but also with people from the agencies and entities that influence and oversee similar projects in Indianapolis. Published academic studies on urban bird population dynamics and bird habitat restoration projects have been reviewed to better understand trends and current issues.

Indianapolis is a world-class city with great natural beauty and ecological richness, but the ever-expanding urban infrastructure is threatening the city's natural systems more and more each day. A native songbird habitat restoration will not only provide critical habitat space for songbirds and many native flora and fauna, but it will also give Indianapolis an important educational resource and provide support for future habitat restoration projects. This project is meant to advance the movement toward a healthier urban ecosystem in Indianapolis.

ACKNOWLEDGMENTS

I would first like to thank my parents for being so supportive of me over the last five years.

Also, a big thanks to my professors and instructors, my studio colleagues, Indy Parks and Recreation, and Crystal Rehder from Indy's Land Stewardship Office for all your help and guidance along the way.

This project would not be possible without your efforts!

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Hans Rasmussen
Undergraduate Landscape Architecture Comprehensive Project
Ball State University, Spring 2012

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Keywords: restoration ecology, habitat restoration, natural systems, biodiversity, habitat suitability, habitat fragmentation, population dynamics, biological processes, native species

The Abstract

1.


FIGURE 1.1 - Indianapolis Canal & Downtown

Indianapolis, Indiana is a world-class city with a rich ecological history. Marion County, the entirety of which is considered Indianapolis proper, was actually once the favorite hunting grounds of Native American tribes who lived in the region (Sulgrove 3). The land was densely covered in trees and teeming with wildlife. As urbanization and populations have increased around Indianapolis, the amount and quality of suitable habitat space for native wildlife have significantly decreased, as is the case in nearly every large city. As development continues around the city, the natural landscape is further impeded by the built landscape; the many natural systems that sustain biota are struggling because of increased human disturbances. This is where restoration ecology comes in. This science looks at creating or reclaiming land for habitat spaces and natural processes, and sustainably managing the land to further assist in ecosystem functions. Indianapolis needs more restorative lands to help offset the damage done to the ecosystem and prevent future disturbances to its natural infrastructure.

So what kind of habitats should be restored? While there will never be a definitive answer to this question, talking to professionals and experts is always a good place to start. The consensus among interviewees was to focus this project on songbirds. Since the end of WWII—the beginning of suburbia—there has been a decline in forest songbird populations over much of the eastern United States (Ehrlich et al).

According to the US Global Change Research Information Office, analyses of bird population trends show that many species were beginning to steeply decline by the 1970s and 80s, and today's continuing development has not made the situation any better. The USGCRIO also notes the economic benefit of songbirds eating insects, which can be worth as much as $5,000 per year for each square mile of forest land. Even migratory songbirds, this source says, play a major role in the health and functioning of ecosystems by dispersing seeds, pollinating flowers, and consuming insects.

A rich biodiversity of songbirds in a given habitat, especially in this region, typically indicates healthy ecological processes—these animals are very integrated into the city's ecological framework. Because of this, a site designed for songbird biodiversity will also be suitable for many other forms of native wildlife. Successfully restored bird habitats have large-scale and long-term positive effects on the surrounding environment, which is why most studies on urban habitat restoration focus on birds. The implementation of this project will help offset some of the habitat loss in Indianapolis. The site will also help educate visitors on restoration and conservation initiatives, environmental management, and sustainable home practices. And, perhaps most importantly, this project's success can help support future restorative endeavors in Indianapolis and across the country.

FIGURE 1.2 - Wood Thrush, an endangered forest songbird

FIGURE 1.3 - Example of a healthy ecosystem

2. Definition of the Problem

What is a successful design for a native songbird habitat restoration at Grassy Creek Regional Park? What positive impacts can the project have on Indianapolis, its ecosystem, its residents, and its future?

Sub-problems

- How will this project improve the city's ecological health?
- What are some common and successful habitat restoration concepts, practices, and principles?
- How can the site become an educational resource for Indianapolis without disturbing or compromising biotic processes?
- What are some of the successes and failures related to habitat restoration projects?
- How will the site address its immediate context—neighborhoods, schools, businesses, and more?
- How will the site fit within the existing framework of Indianapolis's green spaces, corridors, and managed lands?
- How can the site support future restorative efforts in Indianapolis and elsewhere?

Hypotheses

- The site's songbird species richness will greatly improve from the implementation of this project.
- Creating suitable songbird habitat space in Indianapolis will improve the city's overall ecological health.
- Indianapolis Department of Parks & Recreation (Indy Parks) will find multiple ways to use the site as a resource for its people, including integrating it into its framework of green spaces, corridors, and managed lands.
- With proper execution and documentation, this initiative can become the impetus for increasing ecological restoration projects in Indianapolis.
- The positive impacts of this project on the city and its ecosystem will be far-reaching, and the implementation of future projects can jumpstart a widespread ecological healing of Indianapolis.

Delimitations

- This project will not directly address Indianapolis's ecosystem as a whole, but rather focus on habitat spaces which will be beneficial to the whole ecosystem in the long run.
- This project is not per se meant to be a comprehensive ecological restorative plan for Indianapolis or any other urban center, and it is not meant to serve as a structure for general habitat restoration. Instead, it serves as a site-specific study and a small step toward a healthier ecosystem.
- This study will not identify funding sources.

Assumptions

- In general, our ecosystems today are not as healthy as they were in the past, and changes must be made to reverse the damage done.
- Healthier, larger, and more suitable habitat spaces lead to an overall healthier ecosystem.
- People prefer to live in healthy and vibrant ecosystems, not decimated and struggling ecosystems.
- A healthy ecosystem has more to offer people than an unhealthy ecosystem.

Definition of Terms

- **Biodiversity**—diversity among and within the communities of organisms in an environment
- **Biota**—the organisms/life forms of a region or period, considered as a group
- **Biotic process**—in this sense, any biological action necessary to the survival of a site's biota
- **Ecological health**—a comprehensive and multi-layered measurement of an ecosystem's well-being and biotic integrity
- **Genius loci**—the spirit/atmosphere of a site
- **Habitat fragmentation**—a process by which spatial discontinuities in organisms' preferred habitats lead to less stable populations and population fragmentation
- **Hectare**—a unit of land area measurement equivalent to 2.471 acres

3.

Introduction

The following literature review addresses three key aspects in looking at how to design a successful songbird habitat restoration project in Indianapolis. The first aspect is *The Science, Successes, and Failures*, which starts with a brief history of restoration ecology and then addresses common principles and strategies of habitat restoration projects. It also considers the overall role of restoration in ecology and outlines some of the problems currently facing restorative projects. The next aspect is the *Ecology of Indianapolis*, which examines the natural systems that were historically, and are currently, active within the city. These systems include flora and fauna, landcover, hydrology, topography, and the overall genius loci within the natural environment. The final area of this literature review consults *Published Academia* on urban bird studies and bird habitat restoration projects. These studies investigate trends and data on these habitats and projects, and provide the most current and relevant information for projects in the planning and design phases; they also explore issues with turning these projects into

The Science, Successes, and Failures

Restoration ecology is a relatively new science but is one that is garnering more attention every day. In the early 1930s, as the "dust bowls" rampaged across much of the United States, scientists were pushed into thinking about how to prevent such catastrophic ecological damage. They were driven to investigate the management of existing areas of wilderness while also attempting to restore ecological prominence to lands decimated from years of exhaustive use. On the other side of the Atlantic, heavy industry had already started taking its toll on the United Kingdom, and scientists there were also conducting research in hopes of saving their lands (Ormerod 46).

In 1983, a half-century later, the only federal agency looking at an urban wildlife program was the U.S. Fish and Wildlife Service (Adams 142). But by 1985, the National Park Service (NPS) had started the Center for Urban Ecology "to provide scientific guidance, technical assistance and education for the preservation, conservation, and enhancement of park resources within urbanizing landscape" (Adams 142). This move by the NPS, however, did not lead to an immediate increase in urban wildlife habitat projects. It has taken time for this new practice in restoration ecology to take root, but it seems like it is finally getting due recognition. In her 2001 article "Restoration ecology/ habitat creation," Dr. Jo Hughes noted that wildlife-oriented projects, as opposed to botanical projects, were already commonplace, and they have only become more so in years since.

So as projects like this have become a part of mainstream restoration ecology, urban wildlife habitat restoration has begun shifting and evolving just as every scientific niche does. Research papers on different strategies and emerging research findings are becoming less rare, and by comparing and contrasting many of these different articles one can understand the dynamic nature of the field. Katharine N. Suding of University of California-Berkley made note of these constant changes, writing, "Given the rapid expansion of a young discipline, growing pains are not surprising. Restoration ecology has faced critiques from both the science and practice sides of the field" (466).

Despite these critiques, restoration ecologists have pushed onward in their search for knowledge, and the ideas and principles generated have been compounded. In 1993, Mills, Soule, and Doak published "The Keystone-Species Concept in Ecology and Conservation." Their article was one of the first to suggest that instead of simply labeling species as "keystone," more of an emphasis should be put on inter-species interactions (219). It states that there is a significant complexity of factors and scales to consider, which typically prevents a "more important" or "less important" classification without comprehensive research and thorough data collection. Rabeni and Sowa echoed this idea and built on it in 1996 when they suggested implementing biological realism into habitat restoration (Rabeni and Sowa 252). By this, they were saying that habitat conditions need to be researched at multiple temporal and spatial scales—this will help scientists understand their details and complexity enough to create or provide an outline for a successful habitat restoration. Another seminal progression in habitat restoration was seen the following year with a study completed by Lenore Fahrig on the effects of habitat loss versus habitat fragmentation. Fahrig suggested that the connection and arrangement of habitat spaces typically cannot mitigate the effects of habitat loss (Fahrig 603). Since then, professionals in the field have been focusing their efforts first on preventing habitat loss, next on completing habitat restoration, and last on arranging habitat spaces.

In addition to the principles presented heretofore, professionals and experts within and outside the discipline have been calling for a "clearer and more systematic approach to habitat restoration ..." (Miller and Hobbs 382). Although this notion is justified and scientifically sound, anyone who studies land systems for a living knows that habitat spaces can typically only be dealt with on a site by site basis because of the complexities described in the previous paragraph; these ad hoc processes make it very difficult to form a systematic approach. Miller and Hobbs understand that a standardized approach is not practical, and so they suggest forming a basic set of questions to be asked of potential restoration sites. The answers to these questions can then guide and inform the decision-making process, ultimately leading to a successful and somewhat systematic restoration site. With a discipline still in its infancy, though, this systematic approach has not yet been fully developed, let alone accepted.

This lack of infrastructure presents other failures, or weaknesses, in habitat restoration processes, a few of which are outlined by Katharine Suding. In her article "Toward an Era of Restoration in Ecology," she notes the possibility of an unintended divergence across restoration sites (474). Despite similar sites and restoration techniques, abiotic processes often cause additional, unforeseen constraints which may hamper a project's success. Dispersal constraints, increased flooding, and lower restorative potential due to location and context are all issues that present problems for restorative ecologists. Suding mentions another weakness in the restorative process is a project with a trajectory that deviates from common goals (475). Although this seems like a mechanical error in the preparation and delivery of a project, all biota are unique and react differently to stimuli, and so projects can unintentionally and unforeseeably go awry. And it can happen both ways: an initially successful trajectory can turn out to be subpar, and an initially unsuccessful trajectory can immediately redirect and achieve its goals. These issues, combined with the overall unpredictability of natural systems, can cause significant problems with habitat restoration projects.

On the other hand, there have been many successes in habitat restoration, and Suding outlines some of them as well. The first overall success mentioned is that restoration has been a successful guide to recovery (468). While a complete habitat recovery is obviously desirable, a partial recovery can uncover more information to continually guide the process. And although a project with little or no return is the worst possible outcome, it often leads to the discovery or implementation of more successful methods, and it simply becomes a stepping stone in the recovery process. Another success is the act of restoration as compensation for habitat loss. While there are various ratios (called offset ratios) to help determine how much restoration is needed to offset habitat loss, it is hard to believe a restoration could leave a site worse off than before. Restorations are also successful in providing ecosystem services (471). Regardless of a project's success at its initial goals, restorations can almost always provide some basics, like water filtration and reduced erosion. The last success Suding states is restoration to ensure resilience (472). This simple concept makes note that restoration projects are innately sustainable and require few ongoing interventions; eventually, nature takes over and reclaims the land as her own.

Overall, the outlook for the discipline is hopeful. All across the board, professionals are pushing habitat restoration ecology toward more scientific, evidence-based projects and results. And in such a critical field that could have extremely dire consequences, there is no doubt the professionals are right, and also no doubt we are moving in that direction.

FIGURE 3.1 - Volunteers plant trees for a local habitat restoration

FIGURE 3.2 - A mature native habitat planting

Ecology of Indianapolis

Indianapolis has an ecological history much richer than most would presume. In his lengthy 1884 publication History of Indianapolis and Marion County, B.R. Sulgrove goes into great detail about the lands of Marion County, Indiana. All the information presented in this paragraph is from Sulgrove's seminal work. The White River, the only main watercourse in Indianapolis, runs a 22-mile course through the county. The city's topography has gradual hills and valleys, a result of glacial action on the land (2). The uplands and lowlands became the determining factor in what flora, and consequently fauna, have called Indianapolis home. A short excerpt from Sulgrove immediately unveils the beauty of the Indianapolis landscape:

> The central region of Indiana was a favorite hunting-ground of the Indian tribes that sold it in 1818. Its woods and waters were unusually full of game. There were no prairies of any extent and not many swamps. The entire surface was densely covered with trees. On the uplands, which were dry and rolling, the sugar, white and blue ash, black walnut, white walnut or butternut, white oak, red beech, poplar, wild cherry prevailed; on the more level uplands were bur-oak, white elm, hickory, white beech, water ash, soft maple, and others; on the first and second bottoms, sycamore, buckeye, black walnut, blue ash, hackberry, and mulberry (3).

Another excerpt shows the incredible variety of fauna found in the county before its settlement:

> The principal animals in these primeval woods were the common black bear, the black and gray wolf, the buffalo, deer, raccoon, opossum, fox, gray and red squirrels, rabbits, mink, weasel, of land quadrupeds; of the water, otter, beaver, muskrat ; of birds, the wild turkey, wild goose, wild duck, wild pigeon, pheasant, quail, dove, and all the train of wood birds which the English sparrow has so largely driven off,—the robin, bluebird, jaybird, woodpecker, tomtit, sap-sucker, snowbird, thrush (3-4).

Although much greater detail could be given about the ecology of Indianapolis, this adequately conveys what the city's ecology was like prior to extensive human settlement.

As is fairly obvious, Indianapolis is not densely covered with trees anymore. While nearly all of the tree species listed still exist in Indianapolis, they do so in significantly fewer numbers. And clearly the black bear and buffalo no longer roam Marion County, and wolf sightings around the city are rare, just to name a few species that have suffered from the urbanization of this area. So despite some significant losses in its ecological framework, Indianapolis's natural systems still provide residents and visitors with great beauty—and to the delight of the hopeful, there is much potential for improvement.

Published Academia

Birds have been a large focus of research efforts on urban habitat diversity. The article "A historical perspective on urban bird research: trends, terms, and approaches" comprehensively looks at 101 urban bird studies and draws some conclusions from their synthesized data. Typical studies on the impact of urbanization on birds are one or two years long, although there are some notable long-term studies out there. Over 60% of the studies were conducted only during the breeding season, and over 70% were conducted in temperate forests (Marzluff, Bowman, and Donnelly 6). While this literature review has addressed the necessity of understanding habitat restoration at multiple scales, zero of the 101 studies "explicitly discussed the connection between population-level dynamics and community structuring" (8). Another thing this article did was define major points along the urban gradient, which is a model of human settlement patterns. The five terms used for these points are wildland, rural or exurban, suburban, and urban; these terms separate and represent distinct portions of the settlement pattern spectrum (11).

A 2001 study by Esteban Fernández-Juricic and Jukka Jokimäki looks at case studies of urban bird habitats from southern and northern Europe. The two were able to confirm from their studies that park size determines the accumulation of species in urban parks. It was determined that urban parks between 10-35 hectares would contain most of the species recorded in cities (2023). Since all bird species have their own habitat and area requirements, though, the general idea is the more park area that is provided, the more diverse habitat spaces can be created, and thus the higher the biodiversity. Also, bird species richness shows a pronounced decline as the percentage of paved park land increases. The study discovered that in some situations, wooded streets with complex habitat structure can provide alternative habitats for birds and also act as efficient corridors (2030). It also found that in urban parks in Madrid, Spain, "the rate of visitors ... diminishes species richness as well as the temporal persistence of breeding pairs" (2033). The basic finding here is that higher human activity (disturbance) levels create lower biodiversity among birds in urban parks. The study ended by providing a framework for future bird conservation efforts, which focuses on the links between conservation and public involvement at the regional and local scales. They state that the more aware the public is of the necessity of habitat restoration, the more proactive people will be, the more entities will become involved in restoration efforts, and the more policies and laws will be implemented to help foster those efforts (2037).

The next piece of published academia is an article titled "Biodiversity concepts and urban ecosystems." One section of the paper focuses entirely on different approaches to enhance bird diversity in urban environments. The first approach mentioned is the plantation of trees and shrubs. The quantity of potential habitat space and the chosen plant species play large roles in making this a successful approach (Savard, Clergeau, and Mennechez 137). The next approach uses artificial nesting structures to help mitigate lost space for cavity or cliff-nesting species. The provision of bird feeders may be another successful approach, especially during the winter months when birds are hard pressed to find food sources. Regulating human behavior, like ensuring proper management of human waste and careful architectural design, is an approach that can help reduce our impact on urban bird diversity. The final approach mentioned is the creation, restoration, and management of natural areas—this is the most notable approach, as "these patches can greatly enhance local bird diversity" (138).

In 2010, the Indiana Department of Natural Resources conducted a Simulation of Disturbance Activities (SODA) for an area in Fort Harrison State Park. The virtual ecology techniques used can simulate the effects of human disturbance in natural areas. This study was done to determine which types of recreational trail systems will have the greatest disturbance on nesting songbirds. The study concluded that a system with trails through a large mature forest space would create much worse disturbance levels than systems with trails avoiding mature forest space (Zollner et al 58). Another conclusion was that pedestrian-only trails create much lower disturbance levels than multi-use recreational trails. Birds typically found only in mature forest interiors are usually most affected by human disturbance, as their habitats are not frequented as often as edge, successional, and second-growth forests. The simulations showed that the ovenbird was the most affected species; ovenbird populations have been rapidly decreasing from forest fragmentation, and human disturbance from recreational trails has a similar affect (58).

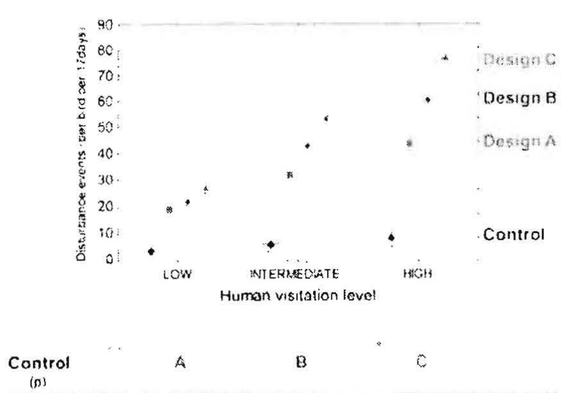


FIGURE 3.3 - The "control" plot is a pedestrian-only trail with much lower disturbance levels

FIGURE 3.4 - A common example of forest fragmentation

It is typically assumed with habitat patches "the bigger, the better." However, this might not necessarily be true for migratory songbirds, as a Purdue University study shows. While large forest patches provide more biodiversity and higher populations, small patches are important for migratory songbirds because they only use them as a quick rest stop along their long flight. This is compared to breeding songbirds, which remain in their habitat patches for extended periods of time. "The Nature Conservancy has recognized the value of small habitat patches for migrants, calling them 'fire escapes' and 'convenience stores' where birds may stop briefly to rest or feed, as opposed to the 'full service hotels' with more abundant resources provided by large forests" (Packett and Dunning Jr. 3).

In many cases the more edge habitat, the more opportunities for wildlife to forage and travel safely. An Indiana DNR article titled "Woodland Edge Enhancement" discusses how to create successful edge habitats with high biodiversity. A forest stand adjacent to a crop field with no transition zone provides very few benefits for native wildlife. The article shows that a woodland edge with a transition zone including all the stages of natural succession is the best way to increase biodiversity (1). It also discusses the shape of these edges, saying that "straighter is not better;" an irregularly shaped woodland edge increases lineal surface area, providing more habitat spaces and making it more difficult for predators to have a clear view of their hunting ground (2).

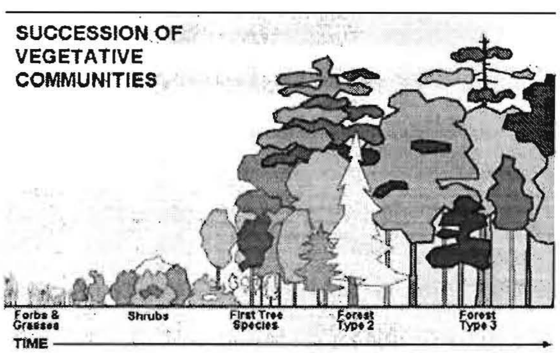


FIGURE 3.5 - If the ground is cleared and left barren, this is its natural vegetative succession

FIGURE 3.6 - A healthy woodland edge habitat

Conclusion

The literature reviewed for this project has provided answers to the problem statement and create guidelines for the project program. With an understanding of the history of restoration ecology and knowledge of current trends and strategies, the project now has a firm base to stand on. All the concepts explored in this review have been considered and applied when relevant in the design process. Possibly the most important finding from this literature review is that ecology is dynamic and ever-changing. Because biotas do not follow any set patterns, restoration ecology is a constantly evolving science. And as it progresses and moves toward more scientific, evidence-based approaches, it gains credence every step along the way. The sources explored indicate the most successful habitat restoration project will draw on all available information and data for programming and design. In 1933, famous ecologist and forester Aldo Leopold stated, "A pair of wood thrushes is more valuable to a village than a Saturday evening band concert, and costs less" (Adams 141). Creating and managing urban habitat space for these thrushes and other birds requires research, planning, execution, and inevitably some adjustment.

Goals & Objectives

GOAL 1: Improve biodiversity and populations of native songbird species

Objective 1: Design diverse woodland habitat spaces with varying densities, canopy levels, and stratification
Objective 2: Design wetland habitat spaces that preserve and enhance existing wetland
Objective 3: Design shrub/scrub habitat spaces
Objective 4: Design grassland habitat spaces

GOAL 2: Ecological Healing

Objective 1: Improve health of soil and vegetation
Objective 2: Clean and manage all stormwater on-site
Objective 3: Maximize productive habitat space
Objective 4: Remove as many invasive species as possible

GOAL 3: Community Interaction

Objective 1: Provide interpretive options for visitors
Objective 2: Provide outdoor learning spaces for school programs and environmental education
Objective 3: Create pedestrian-oriented connections to community
Objective 4: Design trail system through a variety of habitats

Program Elements

HABITAT SPACES
- Woodland
- Wetland
- Shrub/scrub
- Grassland
- Edge

SITE CIRCULATION
- Paths/trails
- Sidewalks
- Boardwalks
- Entry drive & parking area

VISITOR INTERACTION
- Signage
- Seating
- Gathering spaces
- Learning tools
- Art installations
- Vistas

Clients & Users

Native Songbirds: The primary clientele group includes songbirds native to Indiana. For this project, I included migratory songbirds regularly found in Indiana in this group because of the crucial role they play in ecosystems across the state.

Site Visitors: Anyone who visits the site for any reason, including the following: individual visit, group visit, school field trip, data collection, passing through on the greenway, workshops, and other special events.

City of Indianapolis: This clientele group includes Indianapolis residents and the Indianapolis Department of Parks & Recreation.

Other Native Wildlife: Waterfowl, small mammals, reptiles, other birds, and insects are some of the clients included in this group.

Methodologies

In the early stages of this project, I used interviews and personal communication to inform where it should go next. Published academia has been my largest source of information, statistics, and facts about habitat restoration. Case studies on similar projects gave me insight for design development and also showed me how my design might operate if it were actually implemented. Throughout the entire process, continued personal communication with professionals and experts kept my design grounded and gave me pertinent information and rationale. Special thanks to Crystal Rehder and the Office of Land Stewardship at Indy Parks for the invaluable help they gave me as it had profound and positive impacts on my final design.

Location & Context Maps

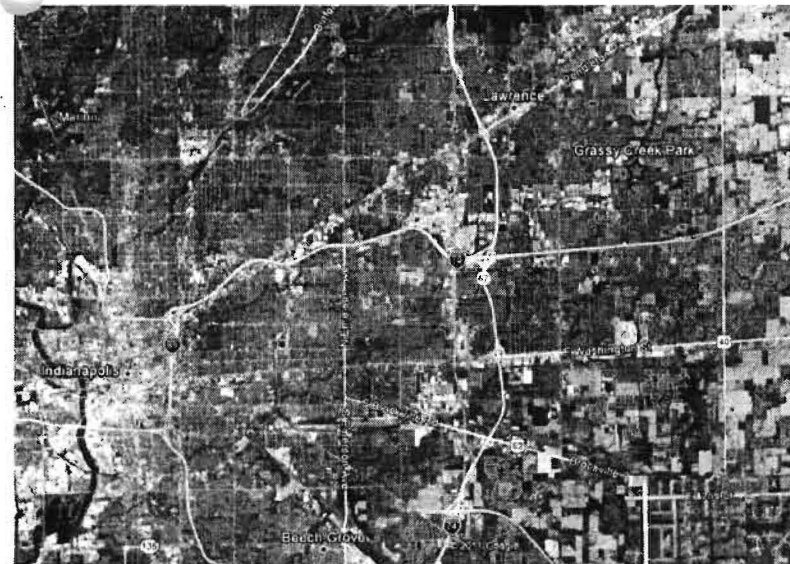


FIGURE 5.1 - GC Regional Park is 10 miles east-northeast of downtown

CITY CONTEXT

- Downtown ~ 10 miles away
- I-465 < 3 miles away
- I-70 ~ 1 mile away

FIGURE 5.2 - 40% of surrounding community is residential land use

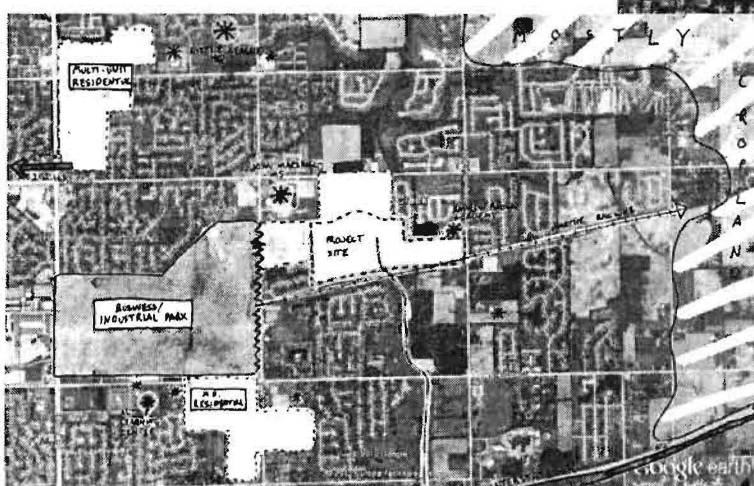


FIGURE 5.3- Initial Site Inventory

COMMUNITY CONTEXT

- Majority of nearby land is single or multi-unit residential
- Elementary and middle schools adjacent to site
- I-70 & I-465 nearby
- Rail line south of site is inactive and will become greenway
- Grassy Creek runs through wetland on site

Site Summary

The site, at 10510 East 30th Street, Indianapolis, Indiana, is northeast of downtown. It has many characteristics that make it an appropriate choice for this project. Many people involved with Indy Parks aided in the site selection process—Crystal Rehder, Brenda Howard, and Don Miller from the Office of Land Stewardship provided the information and perspective to help make the final site selection.

Indy Parks currently owns and manages all of Grassy Creek Regional Park. The land available for the project, depending on future park development efforts, is between 97-122 acres. There are three separate parcels of land that make up the park area. Grassy Creek and German Church & 30th were both existing parks that were recently united with a 47.9 acre parcel of land that was donated to Indy Parks by the Community Alliance for the Far Eastside.

The site shares most of its boundaries with residential areas. John Marshall Community High School is adjacent to the park, and the southeast corner of its property is connected to the northwest corner of the park property. Less than a half-mile west of the site, a business park stretches for well over a mile and dominates the landscape with giant box buildings and large parking lots. Interstate-70 is a mile south of the park. Interstate-465 is two and a half miles to the west. Washington Square Mall is less than three miles due south. Downtown is about 10 miles away to the west-southwest.

Grassy Creek Regional Park currently functions more like two separate community parks rather than one contiguous regional park. The separate parcels of land give the park a noncohesive feel, but future plans alleviate the issue and provide a sense of unity. Regional parks within the Indy Parks system strive to provide the public with "natural settings and a sense of remoteness from urban life," as well as other amenities one would commonly find in a city's most notable parks (Indy Parks).

An existing wetland and pond are in the middle of the north section of the park. There is a wooded area on the western edge of the north section, and adjacent to the southern section of the park there is beech and maple forest. Grassy Creek flows into the park from the north, and the proposed Grassy Creek Greenway follows it south and out of the park. In general, existing vegetation is densest along park edges and tapers into more open space in its core.

Site Photos

- WOODLAND -

- WETLAND -

- SHRUB/SCRUB -

- GRASSLAND -

Site Inventory & Analysis

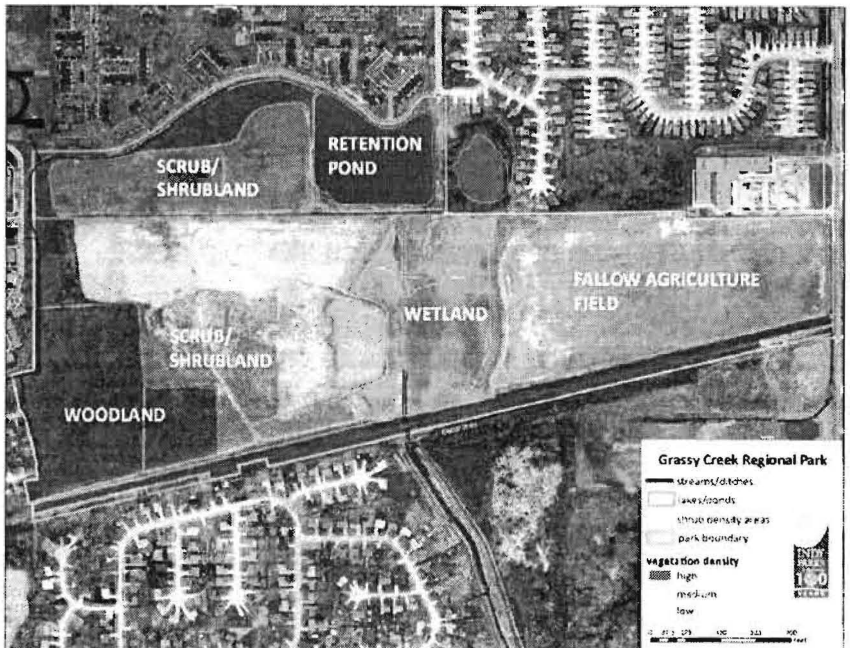
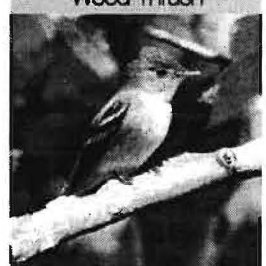


FIGURE 5.4 - Vegetation/Habitat Spaces

Wood Thrush

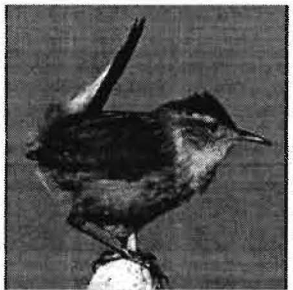


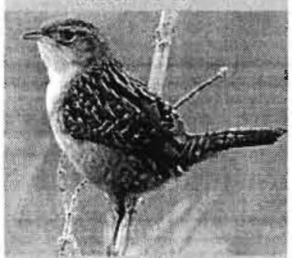
Eastern Wood-Pewee

Kentucky Warbler

WOODLAND

- 21.4 acres
- Indiana songbirds inhabit woodlands more than any other type of land cover.
- Many microhabitats exist in woodlands: open woodland, high canopy, dense groundcover, mature forest, brush & thicket, forest edge.
- The three species pictured here are all of conservation concern. Some species, like the Wood Thrush, need large contiguous tracts of forest to breed and survive.


Marsh Wren

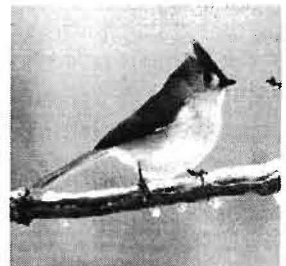

Sedge Wren

WETLAND

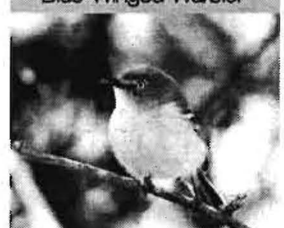
- 19.3 acres
- Although aquatic birds are the majority in wetlands, some songbirds make these habitats home as well.
- These birds use the rushes and sedges for cover while breeding and nesting.
- The wetland at Grassy Creek exists naturally, and the creek runs north-to-south through the area.

SCHRUB/SCRUB/EDGE

- 20.4 acres
- Suburban sprawl is diminishing shrubby and early to mid-succession habitats for birds like the Blue-winged Warbler, which is of conservation concern in Indiana.
- These habitat spaces are home to a multitude of songbirds who forage, breed, and nest among the scrub.


Tufted Titmouse


Blue-Winged Warbler


White-eyed Viero


Great Grey Shrike


Grasshopper Sparrow

GRASSLAND

- 10.5 acres
- Many songbirds benefit from the shelter of grasslands. These habitats provide great foraging opportunities and are easy to maneuver in.
- Fewer songbirds inhabit these spaces than woodland or shrubland, but they are important nesting grounds for many species.
- Most of the grassland at Grassy Creek is "restored prairie," although it never naturally existed on site.

- HP = 852'

- LP = 830'

- Gently sloping

- Water flows to wetland

- Small ridge along rail line

FIGURE 5.5 - Topography Map/Site Contours

- Mainly 3 soil types

- Br, Brookston series, are hydric
- Sensitive to built structures

- CrA, Crosby series, are hydric but less than Br

- This map informs on where to/not to build, plant communities, etc.

FIGURE 5.6 - Site Soils & Topography

Case Studies

MARY GRAY BIRD SANCTUARY

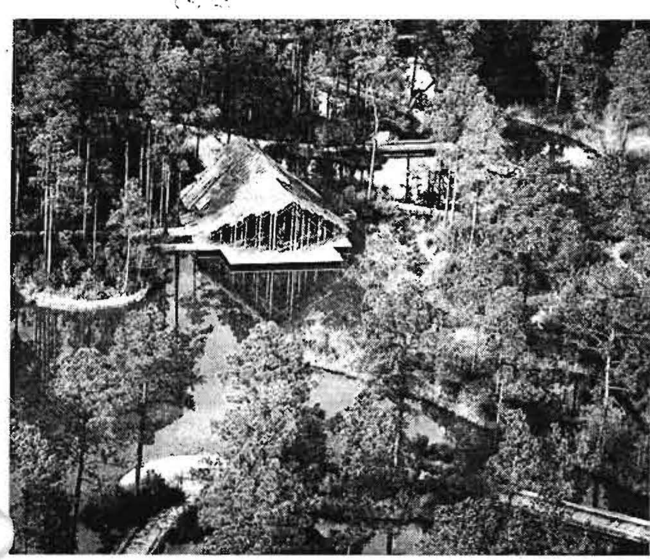
near Connersville, IN

MGBS is a 700-acre property which is free and open to the public. Over 10 miles of trails stretch across the diversely vegetated site. A meeting hall and a fully-furnished barn are available for rental. MGBS is constantly conducting research projects on site.

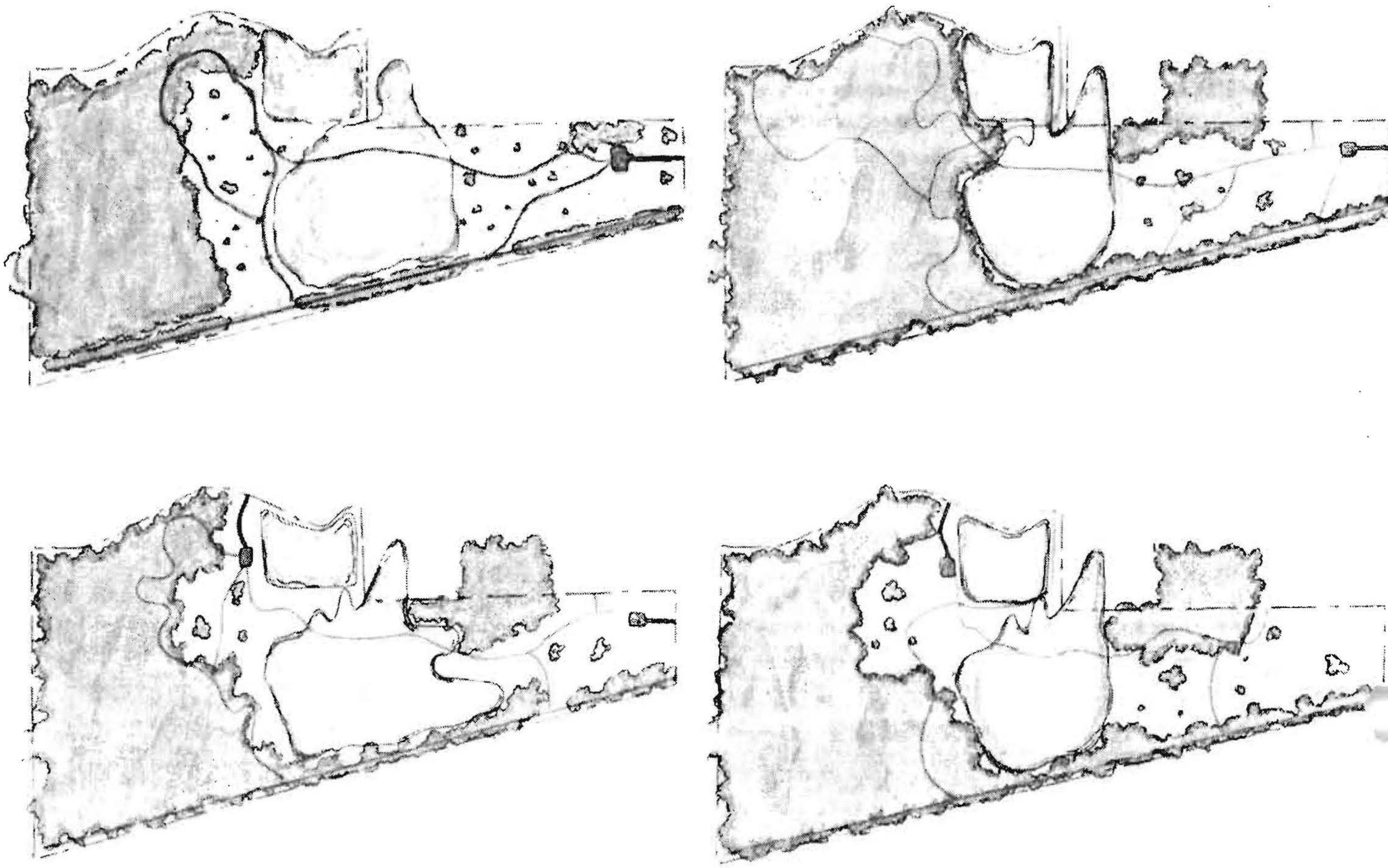
THE CROSBY ARBORETUM

Picayune, MS

One of the premier arboretums in the U.S., Crosby is dedicated to educating the public about their environment. The property is one large sequence of plant communities and habitat types. Various trails, walks, and paths lead visitors around the 104-acre site.



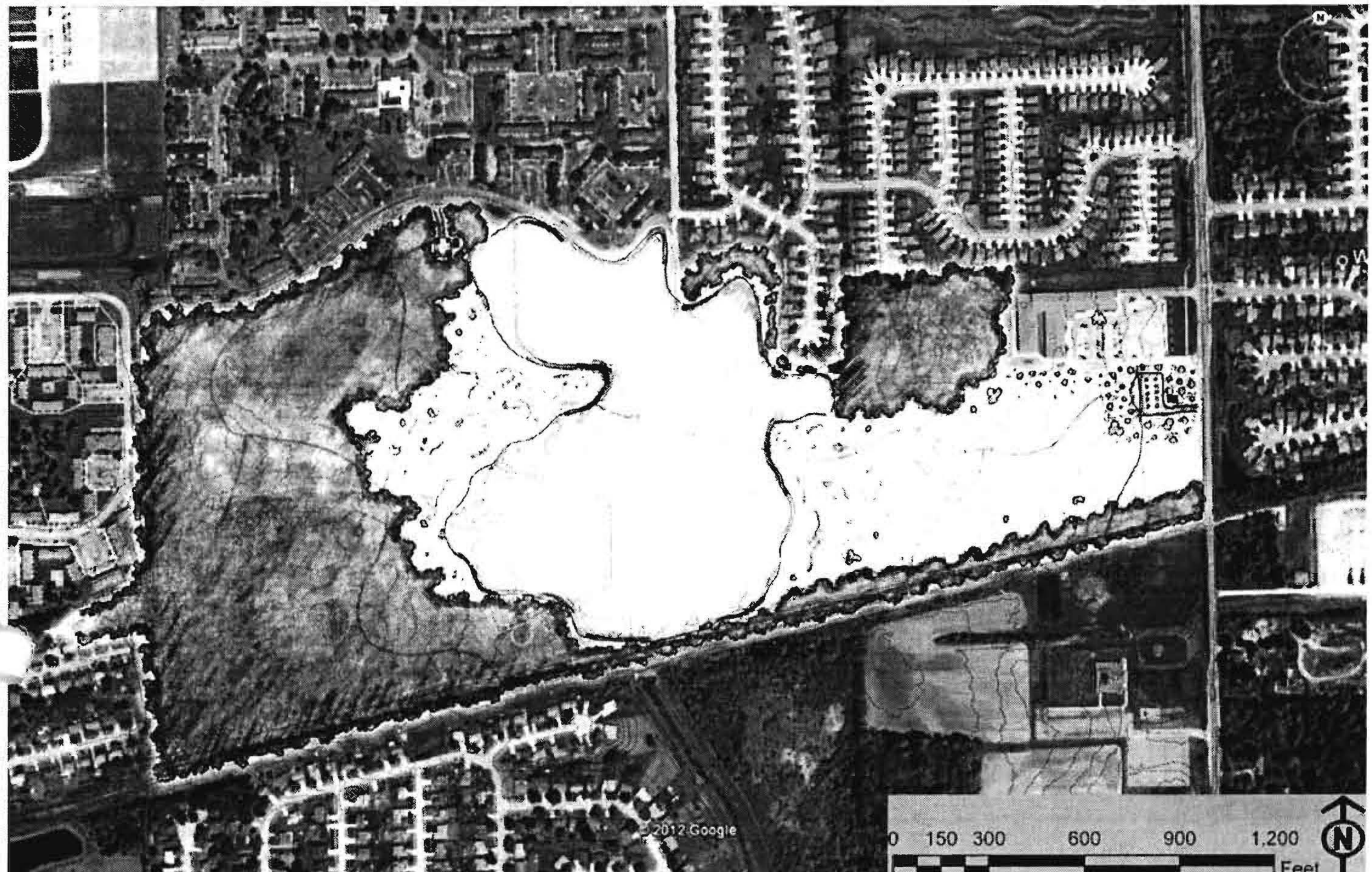
6. Schematic Design



SIZING HABITAT ZONES - Figure 6.1

PRINCIPLES — RATIONALE

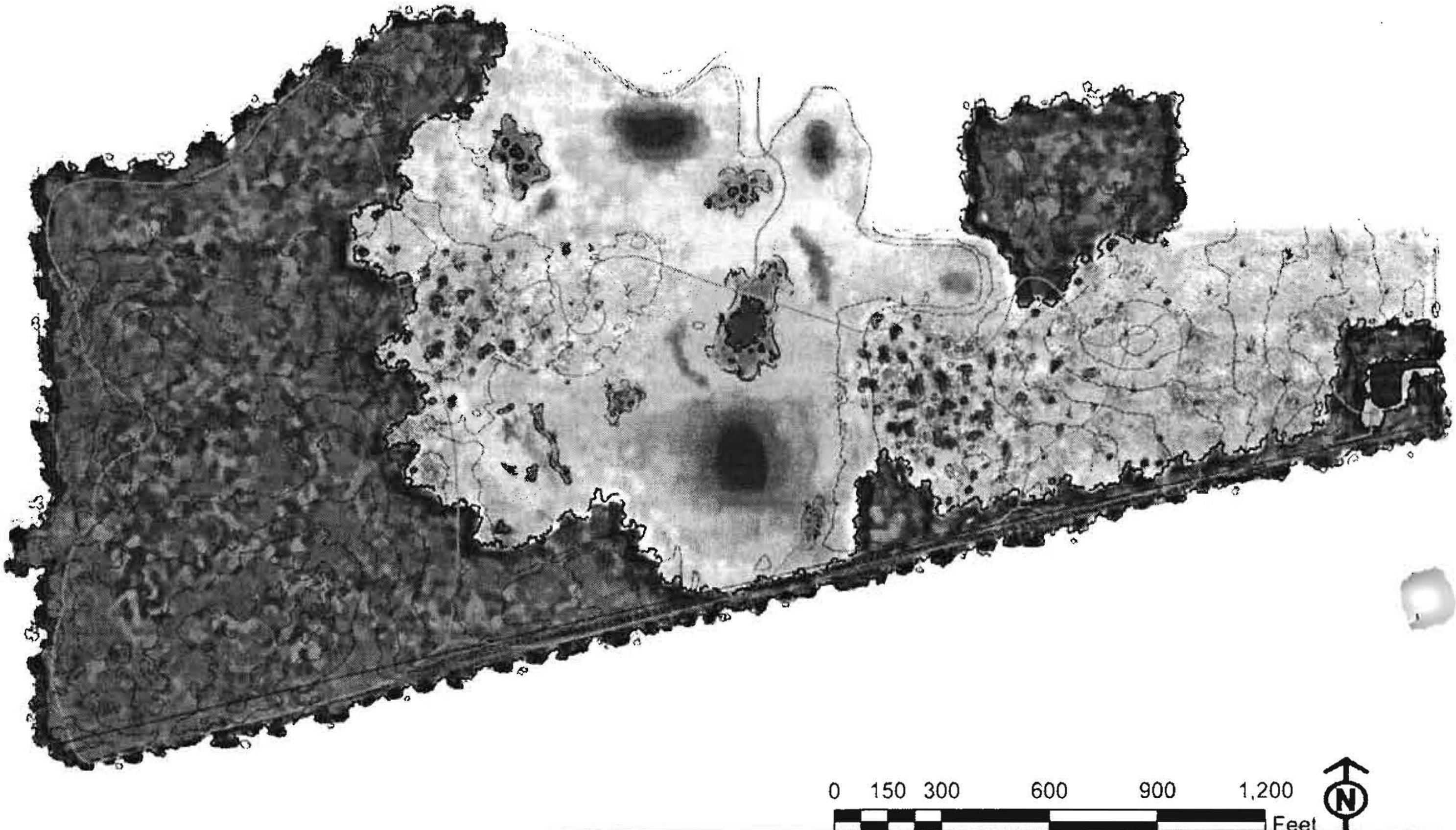
- **Expand woodland for more interior space** --> Interior forest specialist species
- **Expand wetland, let soils guide form** --> Site soils should determine wetland edges
- **Increase woodland adjacent to wetland** --> Many songbirds desire water nearby
- **Reduce grassland but maintain some** --> Grassland needs variety of habitats



SCHEMATIC PLAN - Figure 6.2

MOVING FORWARD

- Enhance diversity of shrub/scrub/edge habitats
- Provide varying wetland depths for flora & fauna
- Design scripted interpretive trail & auxiliary trails
- Create access to all plant community types
- Use high points and low points to create experiences



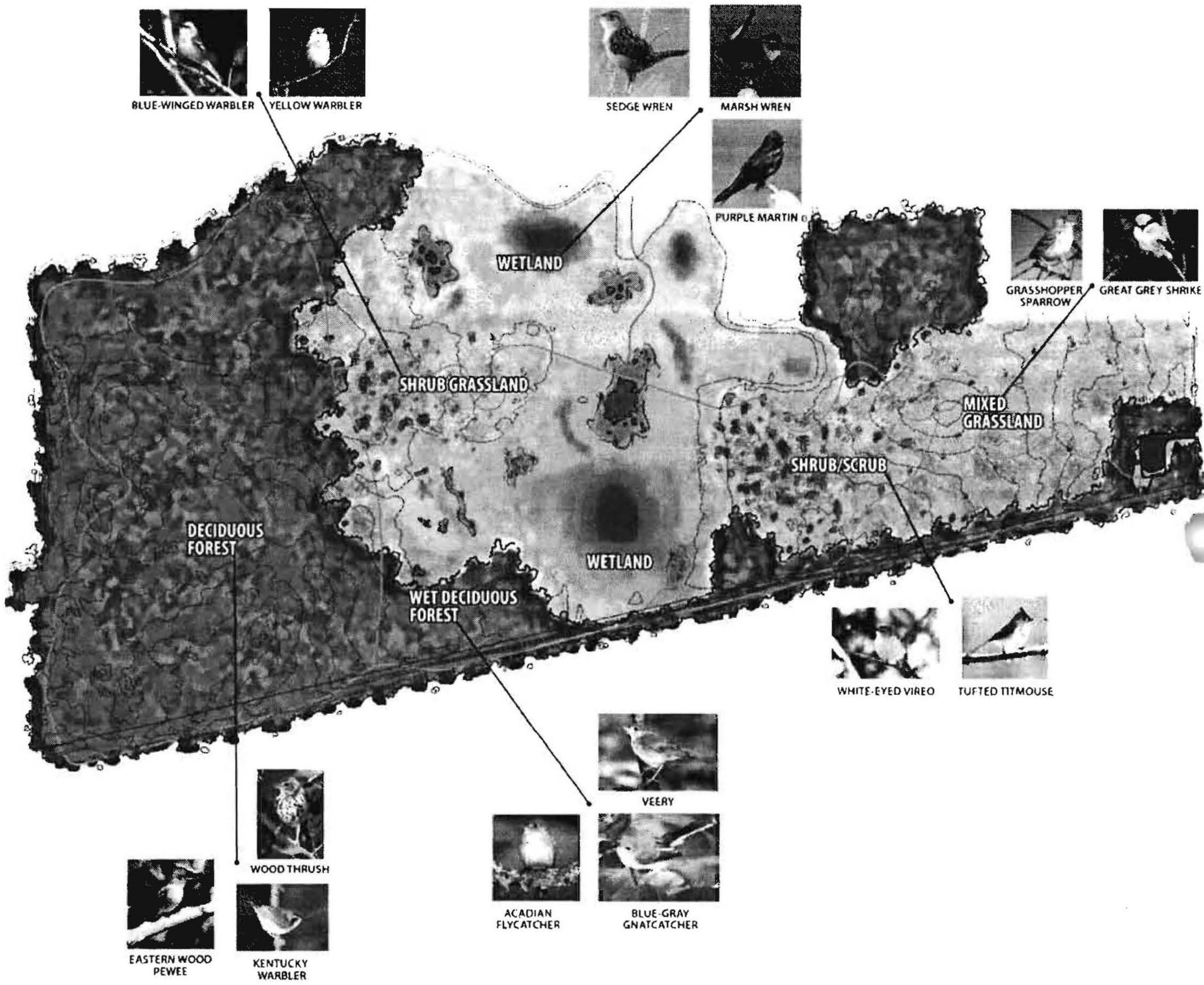
MASTER PLAN - Figure 6.3

Plans & Maps

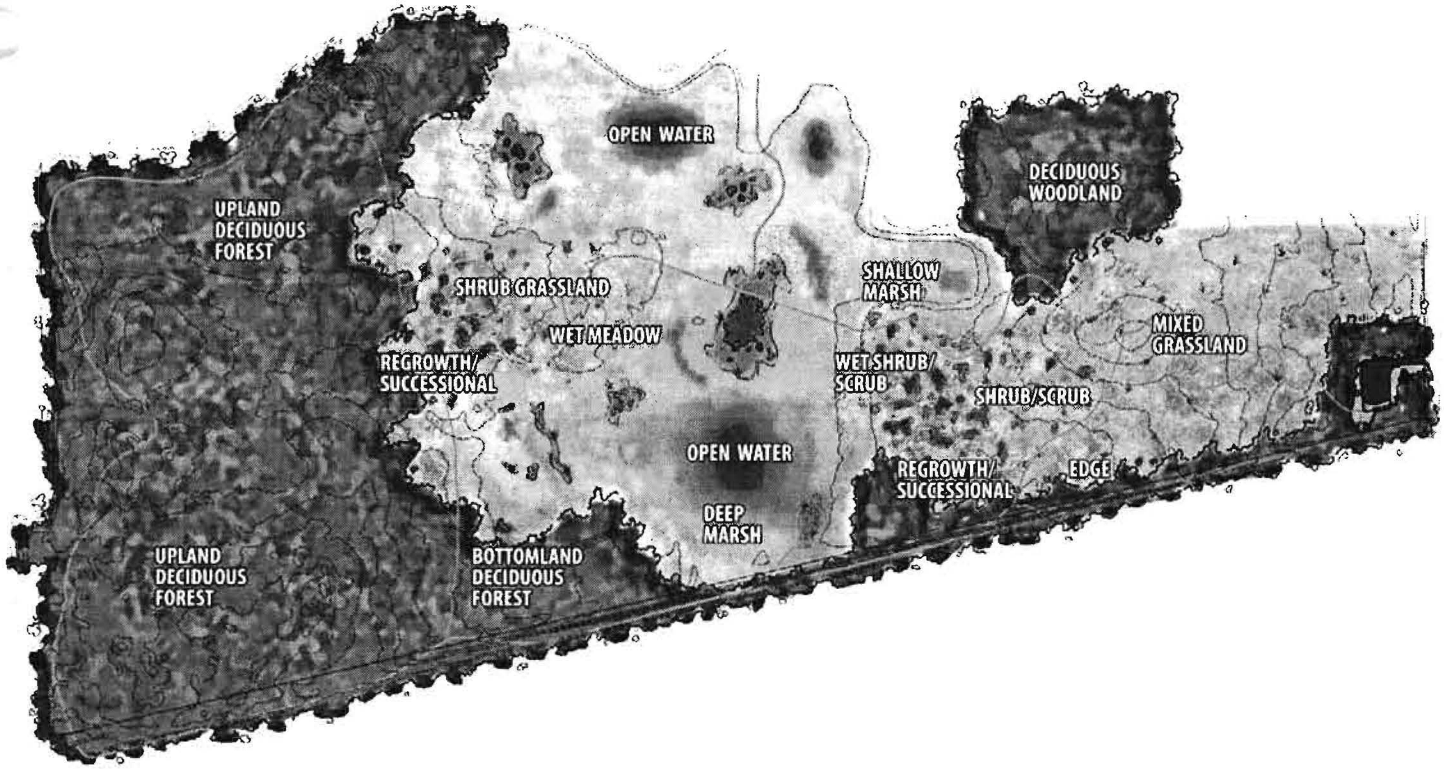
MASTER PLAN OVERLAY - Figure 6.4

WHAT'S UNDERNEATH?

This overlay method emphasizes how the site responds to existing conditions. The wetland is formed around the hydric soils and basins occur at the greatest existing water depths. All areas on the site with mature woodland were maintained because they are very high quality habitats.



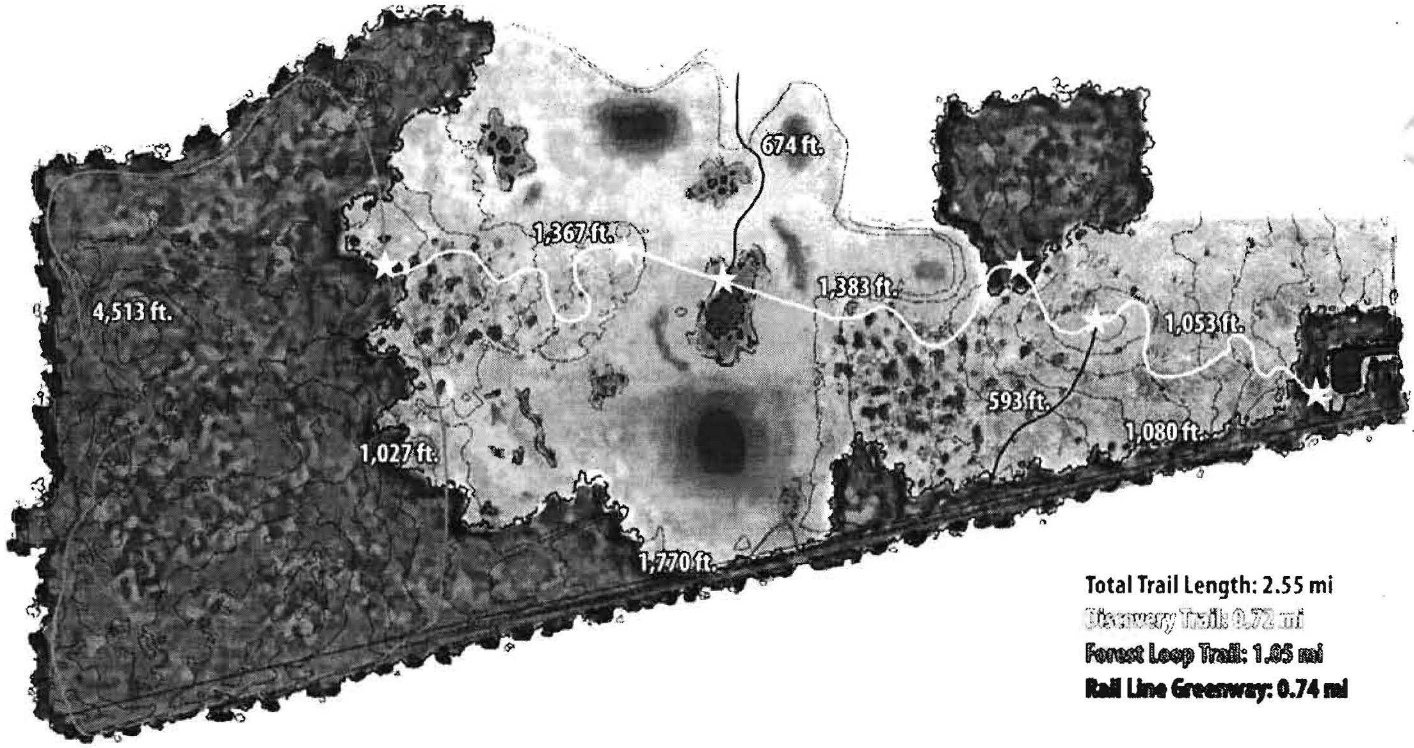
HABITAT TYPES MAP - Figure 6.5



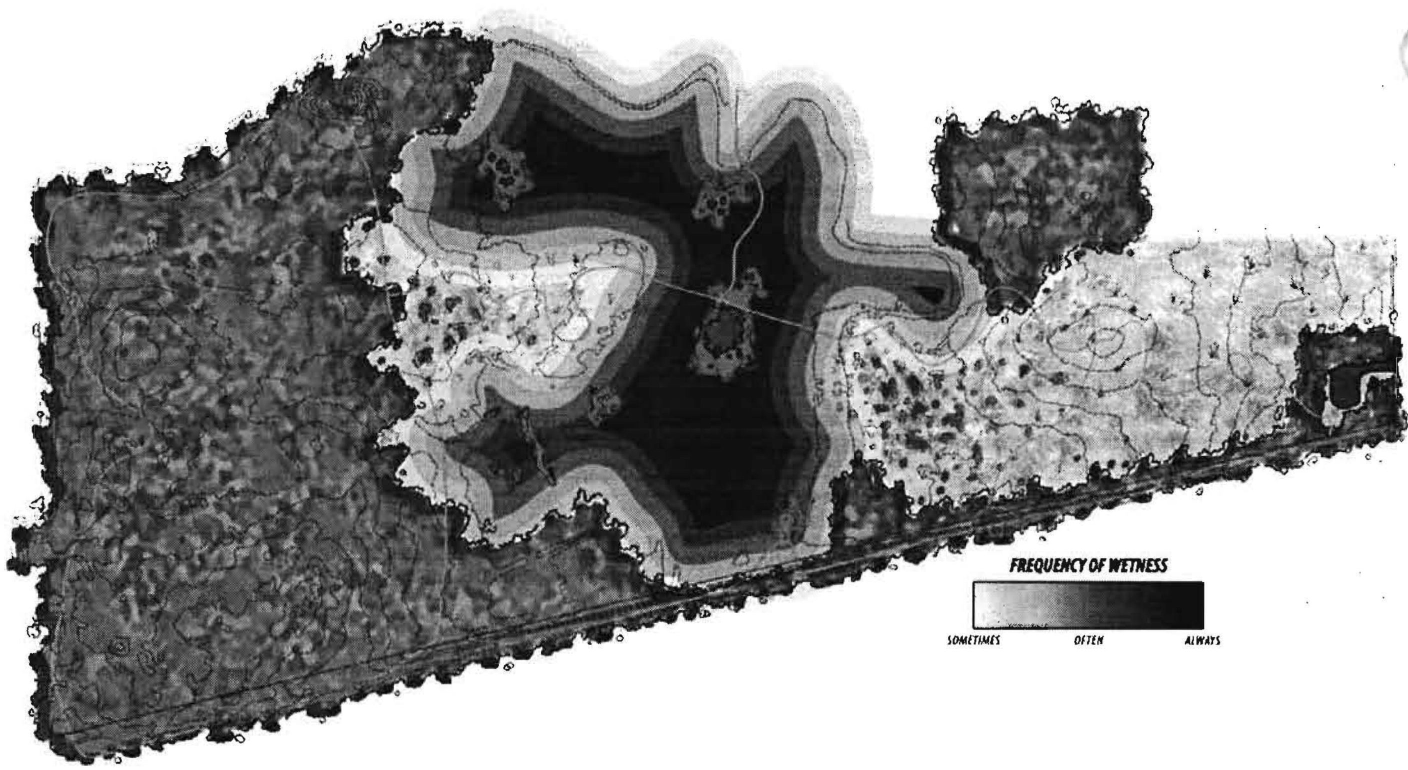
PLANT COMMUNITIES MAP - Figure 6.6

MINI-ECOSYSTEMS

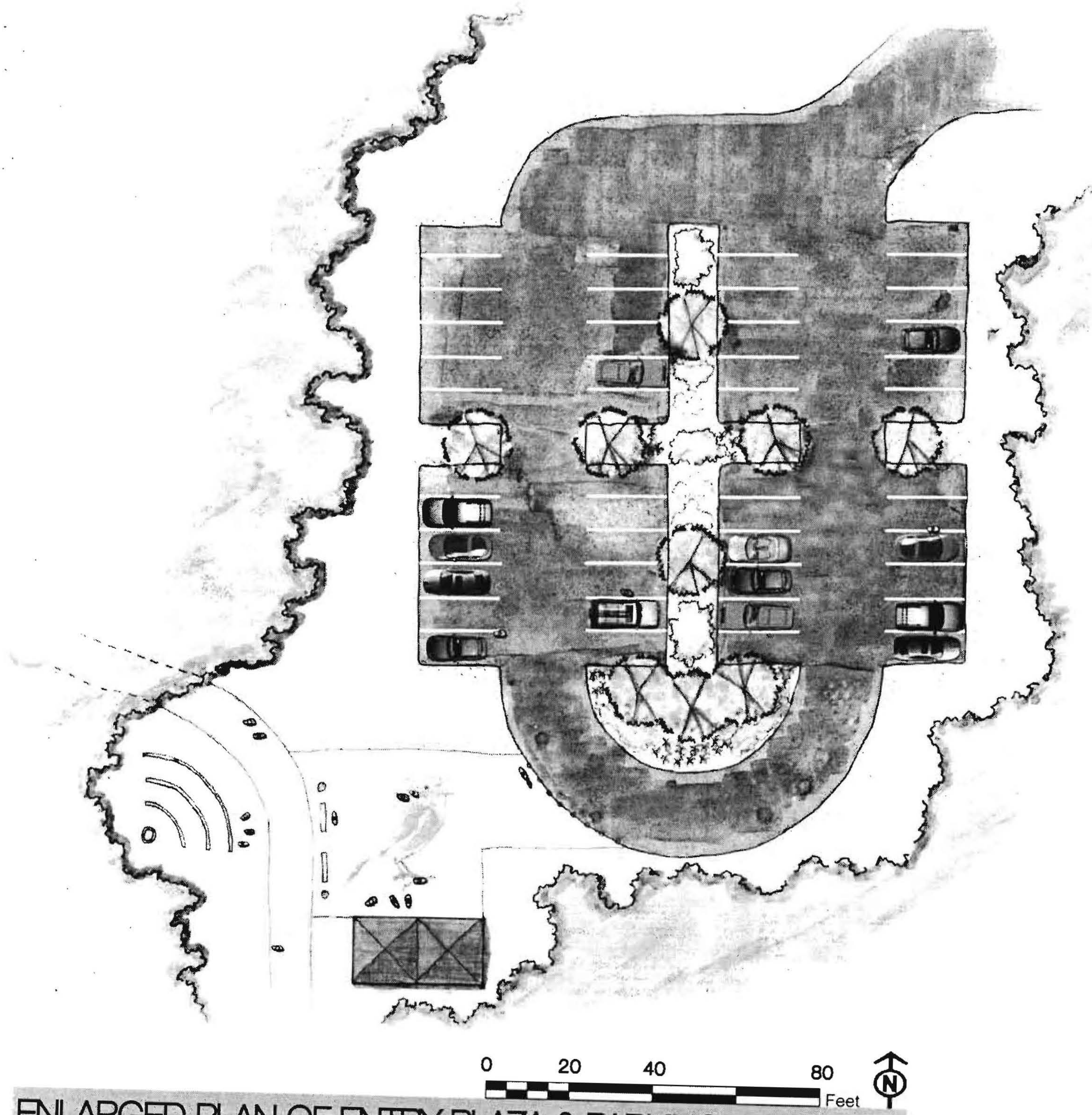
The map above shows the main plant communities located on site. Specific dominant species for each community will be discussed on subsequent pages. Some types, like edge conditions, are more disturbed than others. Reasons for these disturbances mainly focus on adjacent land and properties, but also include microclimatic changes like wind speed, temperature, and solar radiation. The flora and fauna inhabiting these areas must be more resilient. Recent climate changes (warmer summers, milder winters) have ecologists suggesting planting more southernly species to increase habitat diversity.



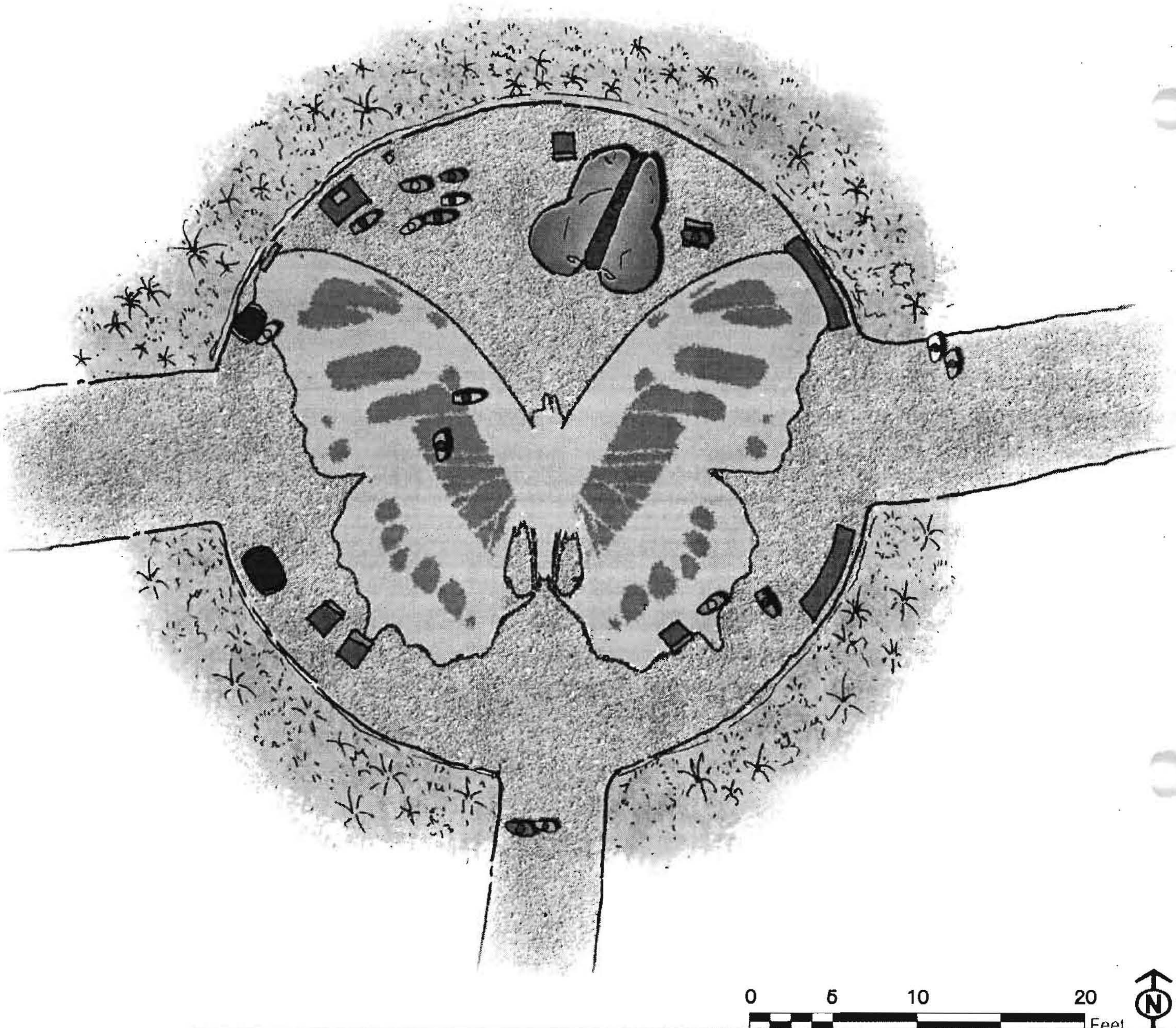
TRAIL SYSTEM MAP - Figure 6.7



WATER LEVEL DYNAMICS MAP - Figure 6.8



ENLARGED PLAN OF ENTRY PLAZA & PARKING - Figure 6.9

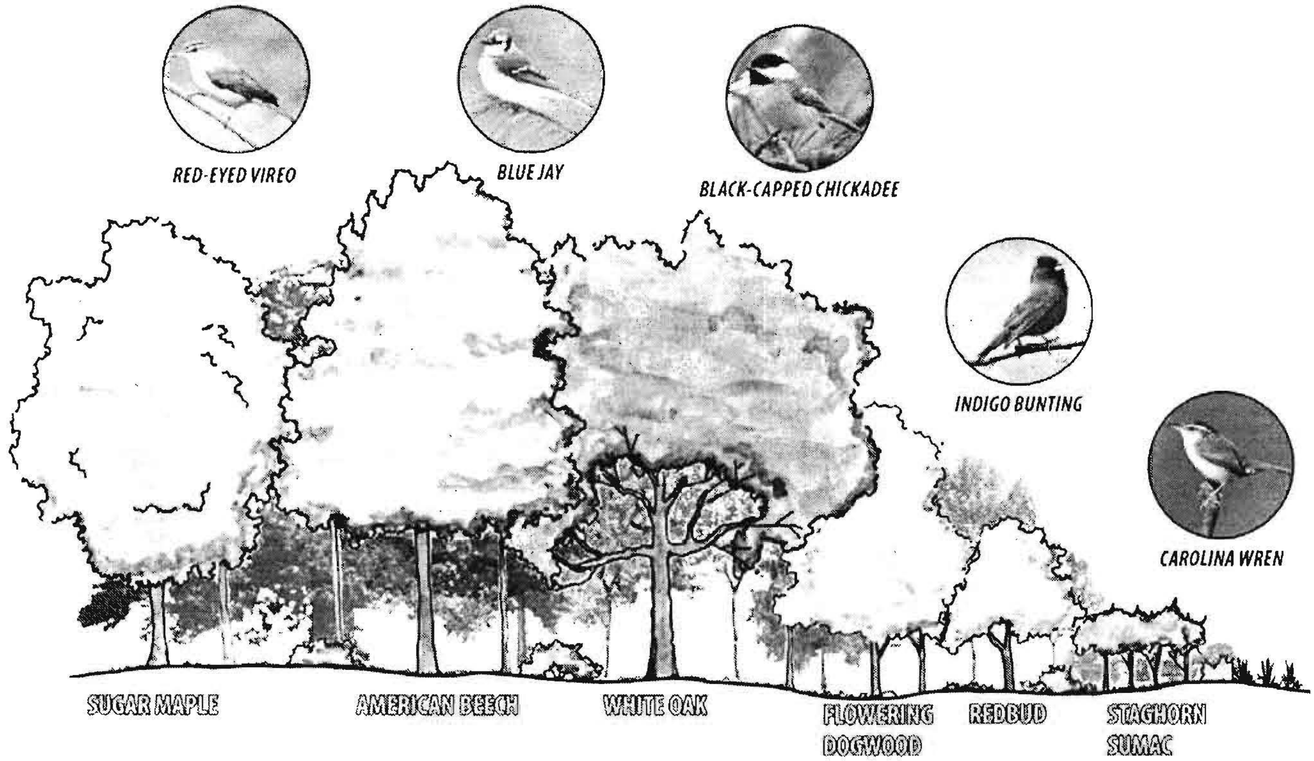


ENLARGED PLAN OF DISCOVERY NODE - Figure 6.10

Discovery nodes are outdoor learning spaces. Each of the six nodes, designated by stars on the Trail System Map, uses a different wildlife species to establish atmosphere and outlook. Common node amenities include interpretive signage, soil samples, water gauges, lookout stations, sculptures (some made from site materials), benches, and movable seating. The Discovery Trail ends at the canopy walk, an elevated boardwalk stretching through the edge of the mature woodland.

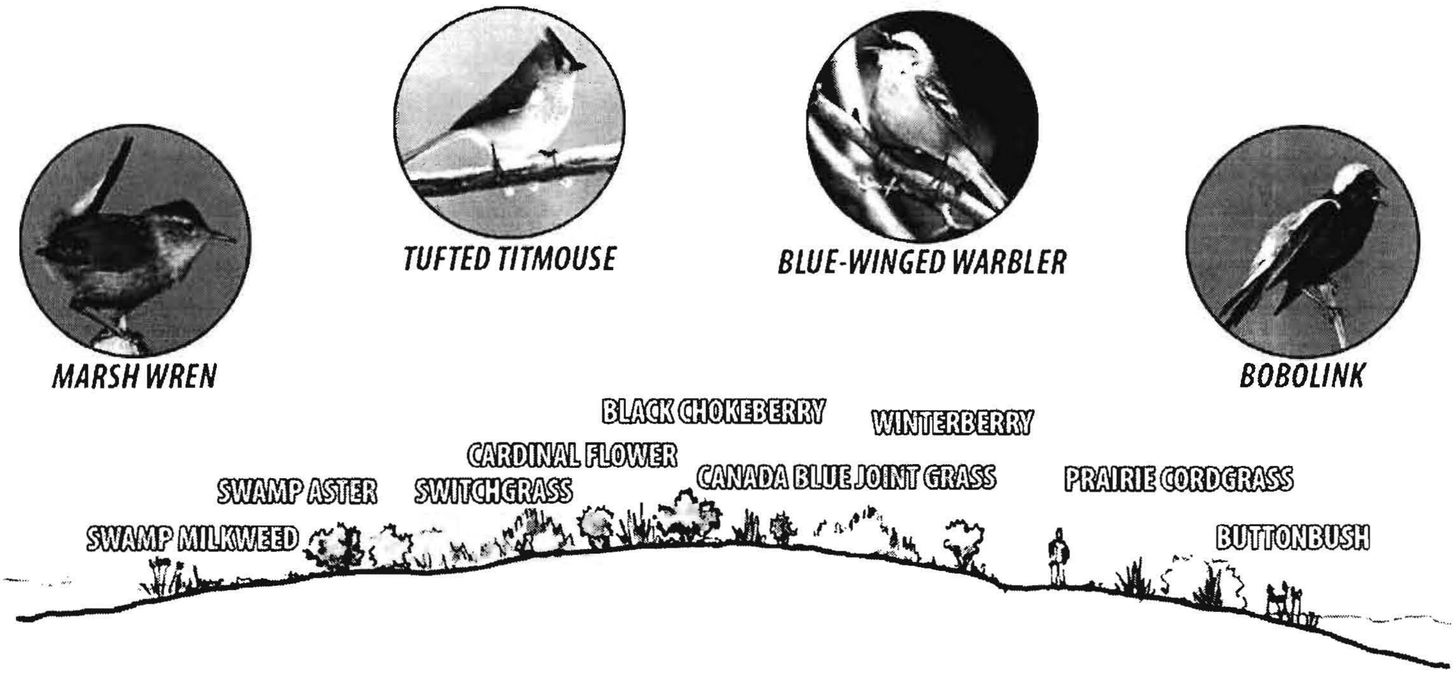
Sections & Views

FOREST-TO-EDGE HABITATS - Figure 6.11

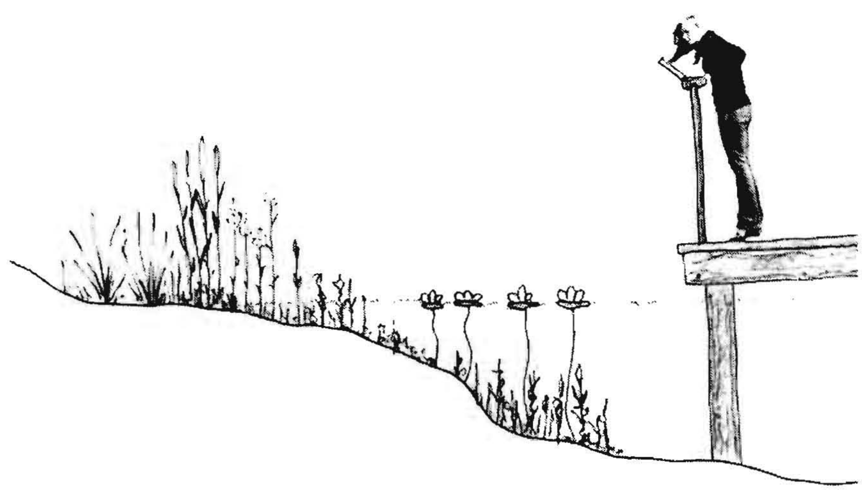


RAIL-LINE GREENWAY - Figure 6.12

WET MEADOW HABITAT - Figure 6.13



EMERGENT WETLAND & BOARDWALK - Figure 6.14



DISCOVERY TRAIL THROUGH GRASSLAND - Figure 6.15

FOREST LOOP TRAIL - Figure 6.16

Plant Palettes - Dominant Species

THIS IS NOT AN ALL-INCLUSIVE LIST; IT IS JUST A SAMPLE OF SOME DOMINANT SPECIES

Upland Deciduous Hardwood Forest
- Acer saccharum—sugar maple
- Fagus grandifolia—american beech
- Quercus alba—white oak
- Liriodendron tulipifera—tulip tree
- Liquidambar styraciflua—sweetgum

Bottomland Deciduous Hardwood Forest
- Acer rubrum—red maple
- Fraxinus pennsylvanica—green ash
- Quercus bicolor—swamp white oak
- Quercus palustris—pin oak
- Nyssa sylvatica—black gum

Regrowth/Successional/Edge
- Cornus florida—dogwood
- Cercis canadensis—redbud
- Prunus serotina—cherry
- Sassafrass albidum—sassafras
- Juniperus virginiana—red cedar
- Ascelpias spp.—milkweeds
- Asteraceae—daisies
- Rubus flagellaris—northern dewberry
- Rhus typhina—staghorn sumac

Mixed Grassland
- Andropogon gerardii—big bluestem
- Calamagrostis Canadensis—blue joint grass
- Panicum virgatum—bwitchgrass
- Schizachyrium scoparium—little bluestem
- Pycnanthemum virginianum—virginia mountain mint

Wet Meadow
- Calamagrostis Canadensis—blue joint grass
- Glyceria striata—fowl manna grass
- Spartina pectinata—prairie cordgrass

Wet Shrub/Scrub
- Spiraea tomentosa—hardhack
- Rubus hispidus—swamp dewberry
- Aronia melanocarpa—black chokeberry
- Cornus sericea—redoiser dogwood
- Cephalanthus occidentalis—buttonbush

Shrub/Scrub
- Vaccinium angustifolium—lowbush blueberry
- Cornus racemosa—gray dogwood
- Lindera benzoin—spicebush

Deep Marsh
- Typha latifolia—broad-leaved cattail
- Scirpus spp.—bulrush
- Eleocharis spp.—spikerush
- Zizania palustris—northern wild rice
- Ceratophyllum demersum—coontail
- Nymphaeaceae spp.—water lily

Shallow Marsh
- Scirpus spp.—bulrush
- Eleocharis spp.—spikerush
- Sagittaria latifolia—broadleaf arrowhead
- Typha latifolia—broad-leaved cattail
- Pontederia spp.—pickerelweed

Songbird Species - by Plant Community

THIS IS NOT AN ALL-INCLUSIVE LIST; IT IS JUST A SAMPLE OF SOME DOMINANT SPECIES

Woodland/Forest
- Western wood-pewee
- Eastern wood-pewee
- Acadian flycatcher
- Blue-gray gnatcatcher
- Kentucky warbler
- Wood thrush
- Blue-headed vireo
- Yellow-throated vireo
- Red-eyed vireo
- Blue jay
- Black-capped chickadee
- White-breasted nuthatch

Wet Forest
- Veery

Regrowth/Successional/Edge Habitat
- Yellow warbler
- Gray kingbird
- Gray catbird
- Indigo bunting

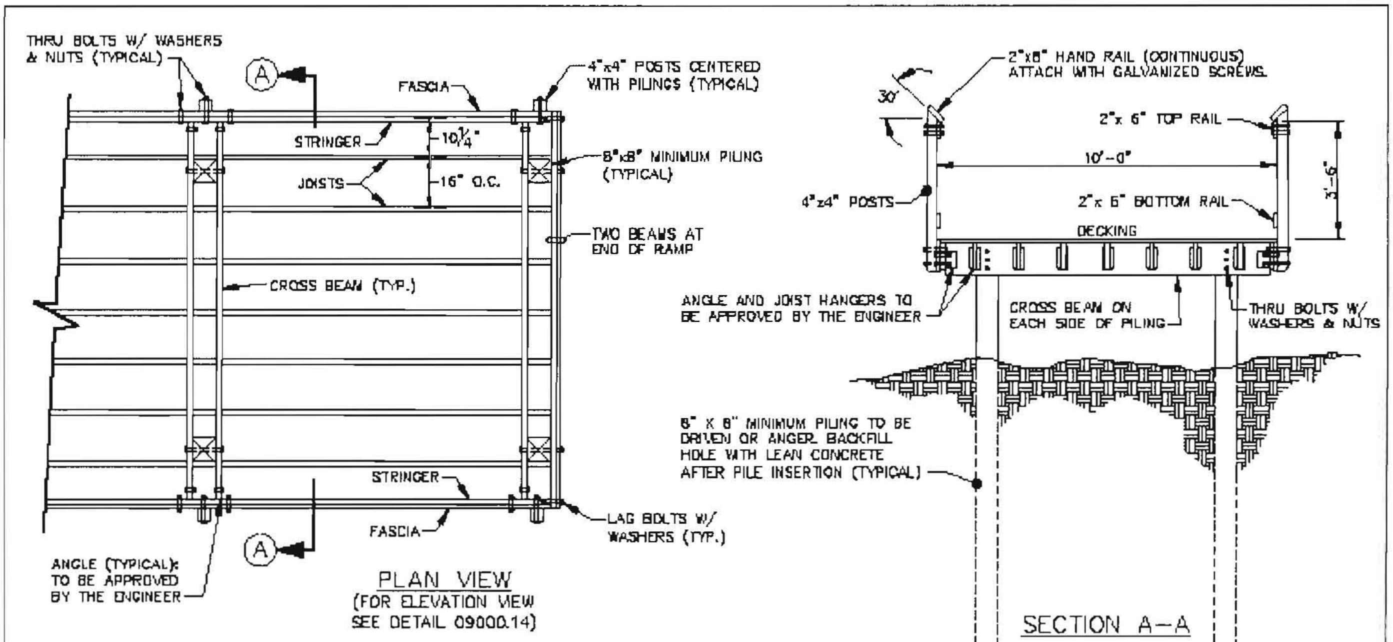
Shrub/scrub
- Blue-winged warbler
- Tufted titmouse
- White-eyed vireo
- Black-billed magpie
- Carolina wren
- Yellow-breasted chat

Grassland/Meadow
- Eastern kingbird
- Western kingbird
- Great grey shrike
- Grasshopper sparrow
- Shore lark
- Eastern bluebird
- Smith's longspur
- Dickcissel

Wet Grassland
- Bobolink

Wetland
- Sedge wren
- Marsh wren
- Purple martin
- Swamp sparrow

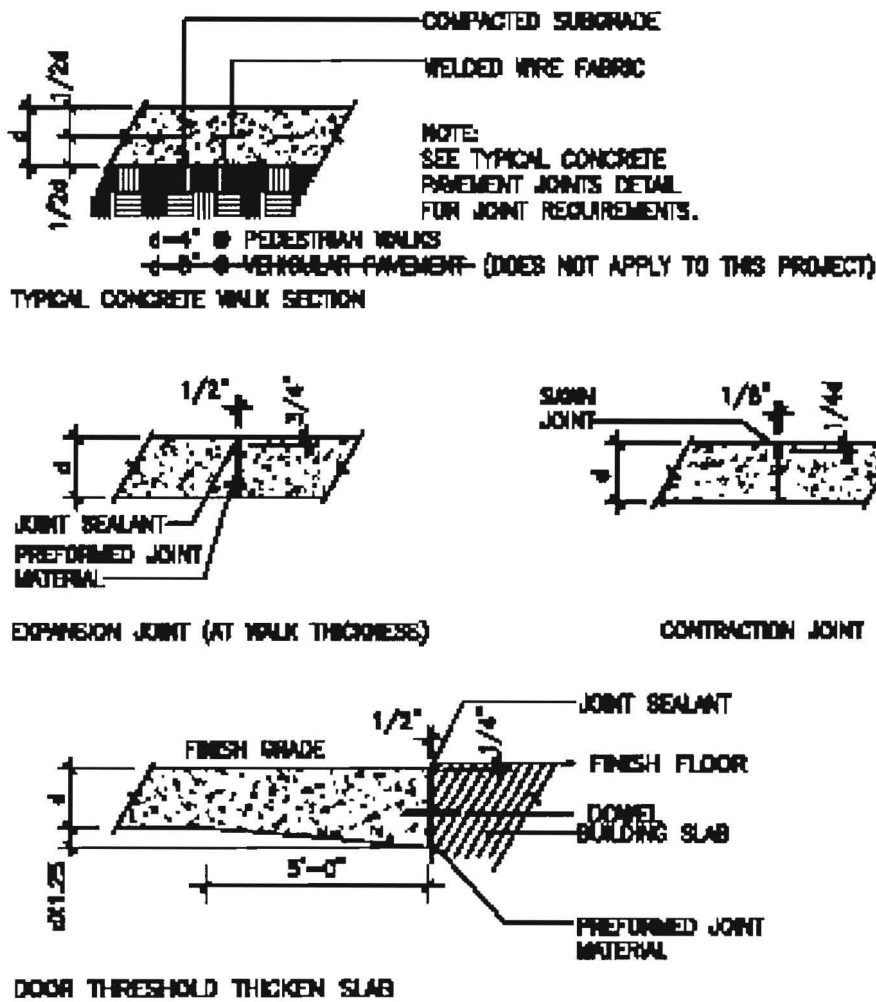
Construction Details



NOTES:

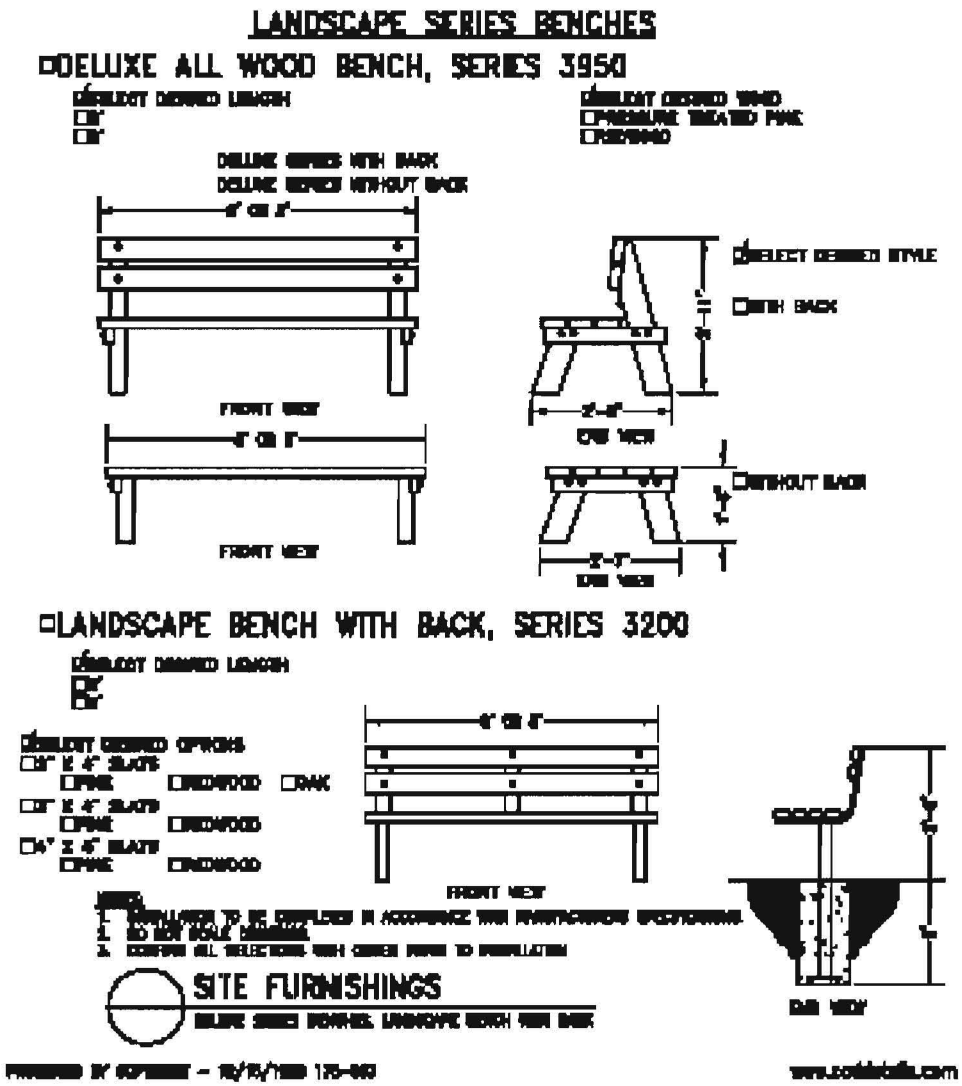
1) MINIMUM PILE PENETRATION FOR PIERS SHALL BE TEN FEET (OR APPROVED DEPTH BY GEOTECHNICAL ENGINEER).
2) SMALL MEMBERS SHALL HAVE PRE-DRILLED HOLES TO PREVENT SPLITTING DURING CONSTRUCTION. DECKING TO BE ATTACHED TO JOISTS USING GALVANIZED SCREWS & HARDWARE (ALL WOODEN MEMBERS SHALL BE BOLTED OR SCREWED TOGETHER. NO NAIL CONNECTIONS).
3) ALL BOLTS, NUTS, WASHERS, ETC. SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A153.
4) TIMBER BOARDWALK IS DESIGNED IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (17 EDITION – 2002). DESIGN LIVE LOAD IS SMALL VEHICLE OF 5000 POUNDS, 2500 POUNDS PER AXLE WITH A MINIMUM 98" WHEEL BASE.
5) SITE SOIL PROPERTIES ARE ASSUMED TO SUPPORT FOUNDATION LOADS. CONTRACTOR SHALL PROVIDE GEOTECHNICAL REPORT TO THE ENGINEER INDICATING THE SITE SOIL PROPERTIES THAT CAN SUPPORT FOUNDATION LOADS PRIOR TO BEGINNING CONSTRUCTION.
6) JOIST HANGER SHALL BE CAPABLE OF SUPPORTING A MINIMUM SAFE WORKING LOAD OF 3150 POUNDS AND SHALL BE GALVANIZED.
7) STRUCTURAL ENGINEER SHALL SIZE ALL LUMBER AND SEAL DETAILS & PLANS.

TYPICAL BOARDWALK (plan & section view) - Figure 6.17



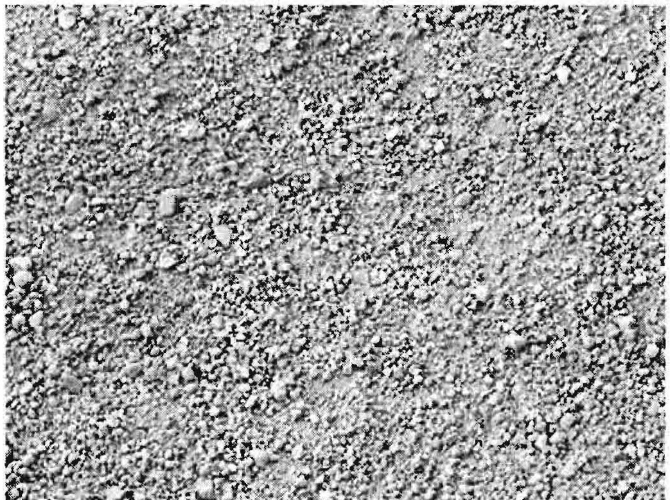
ADJACENT TOPSOIL TO BE GRADED AND SEEDED TO MEET TOP OF CONCRETE SURFACE FLUSH BEFORE SLOPING AWAY AT NO MORE THAN 4:1 SLOPE

TYPICAL CONCRETE WALK & JOINTS - Figure 6.18



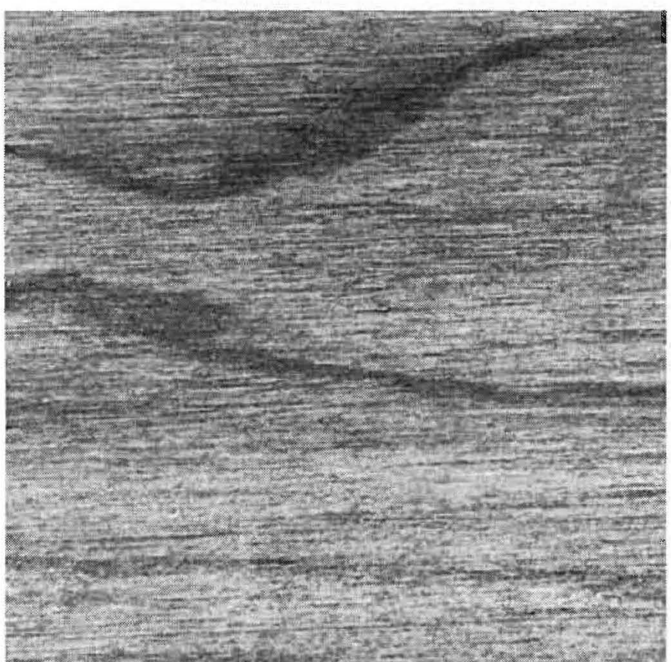
BENCH DETAIL - Figure 6.19

Materials

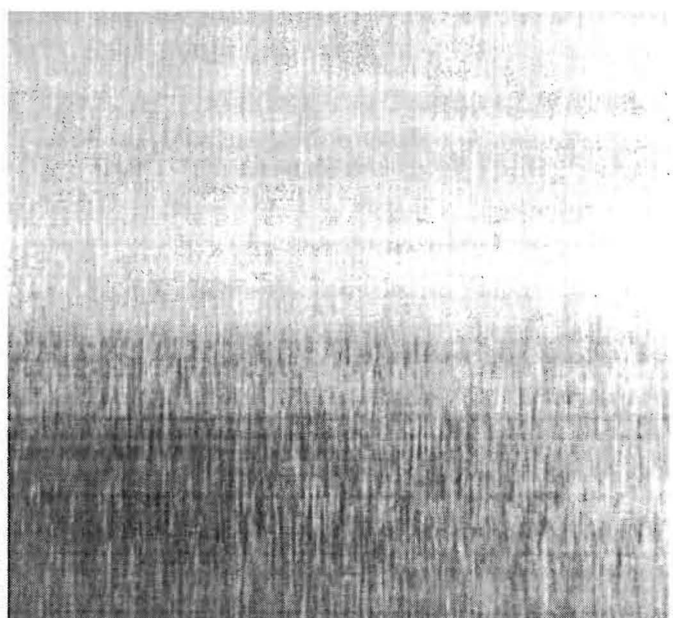


Decomposed Granite Walk

Decomposed Granite w/ Stabilizer



Wood Element Sample



Stainless Steel - Detailing & Boardwalk

7. Concluding Statement

The native songbird habitat restoration at Grassy Creek Regional Park serves a range of purposes and takes a step toward healing our damaged environment. It is an education and recreational resource, and is constantly providing research to help future efforts. While this design is not a template for any other habitat restoration project, it can hopefully serve as a stepping stone toward a healthier ecosystem in Indianapolis and beyond.

Appendix A

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